Different Patterns of Arterial Occlusive Disease in Chronic Critical Limb Ischemia Between Blacks, Hispanics, and Caucasians

Jayer Chung, MD, J Gregory Modrall, MD, Martyn Knowles, MD, Lawrence A. Lavery, DPM, MPH, Carlos H. Timaran, MD, R James Valentine, MD. University of Texas Southwestern Medical Center, Dallas, Tex

Objectives: This study quantified associations between ethnicity and anatomic patterns of arterial occlusive disease in chronic critical limb ischemia (CLI), adjusting for known covariates.

Methods: This was a retrospective review of a prospective database of consecutive CLI patients presenting to the vascular surgery service. Computed tomographic angiograms and digital subtraction angiograms were reviewed. Arterial lesions were defined by location (aortoiliac = aorta and iliac arteries; femoral = common, profunda, and superficial femoral arteries; and popliteal-tibial = infrapopliteal and tibial arteries). Stenoses >50% were deemed hemodynamically significant. Associations between the arteriographic patterns of disease, baseline demographics, and medical comorbidities were quantified using Kruskal-Wallis, χ^2, and Mantel-Haenszel χ^2 tests.

Results: Between August 2010 and January 2014, 286 patients (172 male, 143 with tissue loss) presented. A total of 270 patients had arteriograms: 134 black (50%), 78 Hispanic (29%), and 58 Caucasian (21%; Table I). Hispanic patients (23 [30%]) presented with the highest incidence of isolated infrapopliteal disease (IPD; $P = .02$ by χ^2). Caucasian patients (eight [14%) presented more frequently with aortoiliac occlusive disease than Hispanic or black patients ($P < .01$ by χ^2). Diabetes mellitus was more prevalent in Hispanic patients (72 [85%]) relative to black (77 [55%]) and Caucasians patients (32 [52%]; $P < 0.001$ by χ^2). Median hemoglobin A_{1c} (HbA_{1c}) was also higher among Hispanic (7.3%; interquartile range [IQR], 6.2, 9.9) vs black (6.6%; IQR, 5.8, 8.2) and Caucasian patients (6.0%; IQR, 5.6, 7.6; $P = .002$ by Kruskal-Wallis). More Caucasian (53 [87%]) and black patients (113 [81%]) abused tobacco compared with Hispanic patients (48 [57%]; $P = .001$ by χ^2.) When stratified by baseline HbA_{1c}, there was no relationship between ethnicity, and IPD with HbA_{1c} 8.9% had a significantly higher probability of having IPD ($P = .005$ by Mantel-Haenszel χ^2). Smoking was not associated with any anatomic pattern of disease (P = not significant by Mantel-Haenszel χ^2.) Use of statin, antiplatelet, β-blocker, angiotensin-converting enzyme inhibitor/angiotensin-receptor blocking medications was similar across all ethnicities (P= not significant by χ^2).

Conclusions: Hispanic patients present more frequently with IPD, which may contribute to previously reported outcome disparities. IPD may be modifiable, as the most severely afflicted diabetic patients are at the highest risk. Future interventions to improve outcomes should aim to understand mechanisms of diabetic arteriopathy and barriers to proper glycemic control, especially among Hispanic patients.

Table. Distribution of ≥ 50% hemodynamically significant stenoses among 270 consecutive patients with critical limb ischemia (CLI) stratified by ethnicity.

Anatomic level of > 50% stenosis	*Black (n = 134), No. (%)*	*Hispanic (n = 78), No. (%)*	*Caucasian (n = 58), No. (%)*	P *value*
All levels	23 (17)	10 (13)	10 (17)	0.64
Aorto-iliac only	2 (2)	0 (0)	8 (14)	<0.01
Aorto-iliac and femoral only	12 (9)	3 (4)	3 (5)	0.29
Aorto-iliac and infra-popliteal only	7 (5)	0 (0)	6 (10)	0.02
All infra-inguinal levels	64 (48)	40 (51)	20 (35)	0.15
Femoral only	11 (8)	2 (3)	6 (10)	0.15
Infra-popliteal only	15 (11)	23 (29)	5 (9)	<0.01

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Tibial Bypass Fails to Improve Healing Time of Wounds Compared to Serial Endovascular Tibial Intervention

Andrew M. Reittinger, Samuel N. Steerman, MD. Eastern Virginia Medical School, Norfolk, Va

Objectives: Critical limb ischemia (CLI) has been traditionally treated with bypass surgery, but studies indicate that endovascular techniques can be a safe, effective method of revascularization. Subsequent intervention is often required in CLI patients that had previously undergone initial percutaneous treatment, and the superiority of repeat endovascular interventions or tibial bypass is not clear in these patients.

Methods: A retrospective study was performed of all patients who underwent multiple tibial revascularizations for CLI from January 1, 2000, to September 24, 2013. All patients underwent endovascular tibial interventions as the initial procedure. The tibial bypass (TB) group included patients that had a tibial bypass as the second procedure. The multiple endovascular interventions (MEI) group included patients treated with repeat endovascular tibial intervention. Group demographics, procedural data, and outcomes were compared using *t*-test and Kaplan-Meier survival analysis.

Results: The TB group and MEI group included 32 and 181 patients, respectively. The groups were similar in demographics, medications, and risk factors. The MEI group had an average of 1.35 percutaneous revascularizations, with five being the maximum. Preoperative indications for intervention in TB vs MEI were rest pain (25.00% vs 19.34%; $P = .464$), ulceration (37.51% vs 47.50%; $P = .297$), and gangrene (21.88% vs 20.99%; $P = .911$). Average preoperative Rutherford scores for the TB and MEI groups were comparable (4.774 vs 4.879; $P = .440$). Tibial disease within the TB and MEI groups was classified as TransAtlantic Inter-Society Consensus (TASC) A (6.25% vs 7.73%; $P = .629$), TASC B (34.38% vs 38.67%; $P = .646$), TASC C (3.13% vs 14.36%; $P = .079$), and TASC D (53.13% vs 19.89%; $P < .0001$) after the initial angiogram. The TB and MEI groups were followed up for an average of 568.47 days and 453.84 days ($P = .161$) after the final intervention, respectively. There were no significant differences between TB and MEI in mortality (18.8% vs 24.9%; $P = .458$), postoperative complications (21.9% vs 15.5%; $P = .370$), major amputation (28.1% vs 30.4%; $P = .802$), minor amputation (32.3% vs 34.6%; $P = .802$), ulcer healing rate (260.54 days vs 355.86 days; $P = .328$; Fig) or ulcers healed (59.10% vs 46.15%; $P = .258$).

Conclusions: After the initial endovascular tibial intervention, performing multiple endovascular tibial interventions produces a rate of wound healing and limb salvage equal to lower extremity bypass.

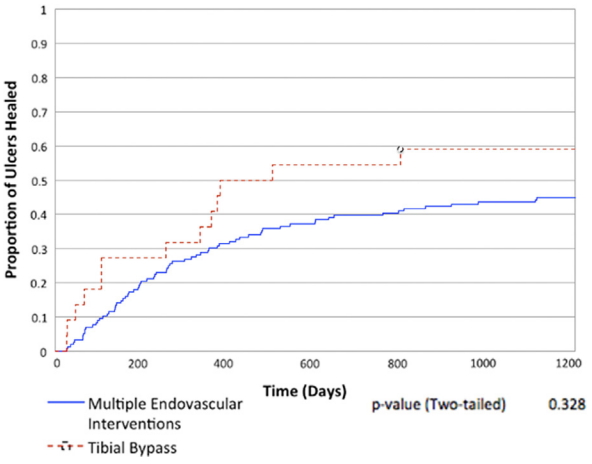

Fig. Ulcer healing rate.

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Independent Predictors of Readmission After Femoral-to-Popliteal Artery Bypass Grafting in Diabetics

Khanjan H. Nagarsheth, MD, Jonathan Schor, MD, Kuldeep Singh, MD, Matthew D'Alessandro, MD, Saqib Zia, MBBS, Jonathan Deitch, MD. Staten Island University Hospital, Staten Island, NY

Objectives: A database review was performed to determine which factors contribute to hospital readmission for diabetic patients within 30-days of femoral-to-popliteal artery bypass (FPB) surgery.

Methods: The National Surgical Quality Improvement Program (NSQIP) database was queried from the years 2005 to 2011 to identify diabetic patients who underwent FPB. Patients groups by those who were readmitted (RA) ≤30 days of operation and those who were not readmitted (NRA). Patient demographics, comorbidities, perioperative data, and outcomes were compared.

Results: Of the 5523 patients identified, 334 were in the RA group and 5189 were in the NRA group. There were 208 vein bypasses in the RA group and 2949 vein bypasses in the NRA group. The rest were prosthetic conduit. Difference in bypass conduit approached but did not achieve statistical significance ($P = .051$). The RA group had a higher proportion of patients with